

## Ch. 8 notes (8.2) Creating probability models

### Example: Unfair Coin

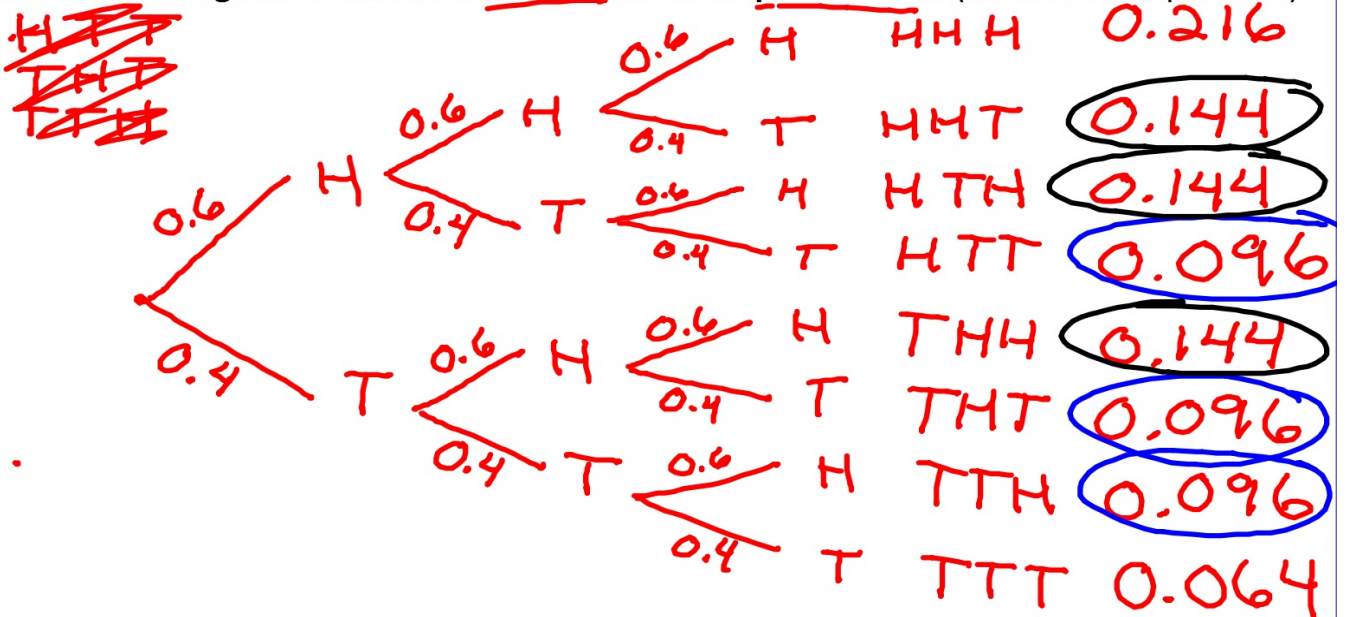
$$P(H) = 0.6$$

Toss 3 times

Let  $X = \# \text{ of Heads}$

The key to these situations: all trials are constant independent

**Create a tree diagram to find all outcomes and their probabilities (trials are independent):**



Using the outcomes and their probabilities, create a probability distribution below:

#H	$L_1$	$x$				
			0	1	2	3
	$L_2$	$P(x)$	0.064	0.288	0.432	0.216
						= 1

$$\begin{array}{c} \uparrow \\ 3 \times 0.096 \end{array} \quad \begin{array}{c} \nwarrow \\ 3 \times 0.144 \end{array}$$

$$P(x=1) = 0.288$$

$$P(x \geq 2) = 0.432 + 0.216 =$$

$$\text{expected \# } E(x) = 1.8$$

**Example: Major League Hitter**

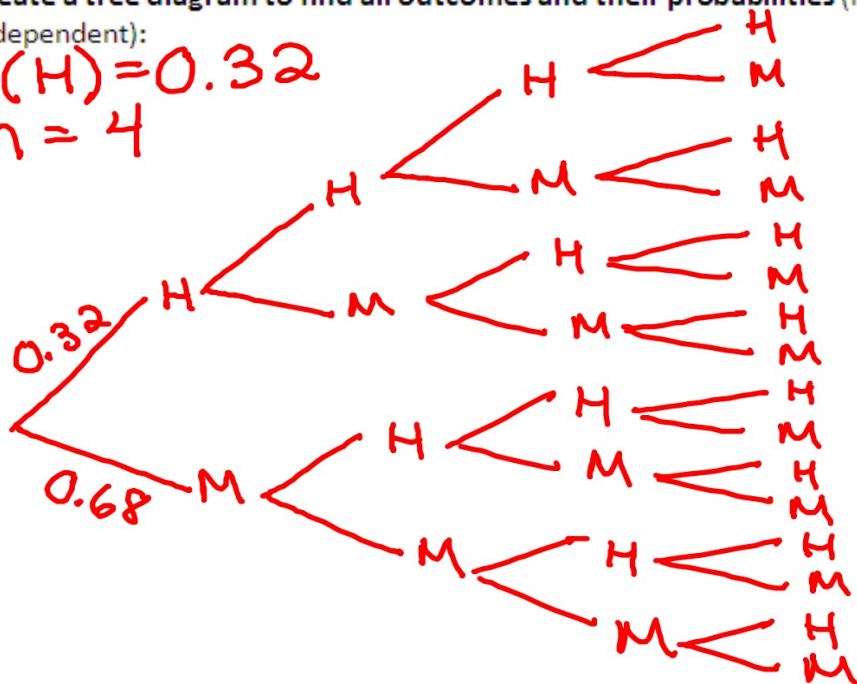
A certain batter has a 0.32 chance of getting a hit at any at bat. Assume that the batter goes to bat 4 times in a game and either gets a hit or gets out each time. Each at bat is independent of the others

$X = \# \text{ hits}$

Create a tree diagram to find all outcomes and their probabilities (remember all trials are independent):

$$P(H) = 0.32$$

$$n = 4$$



Using the outcomes and their probabilities, create a probability distribution below:

# hits

X	0	1	2	3	4
P(X)	0.2138	0.4024	0.2838	0.0892	0.0105
		$\uparrow$ $4 \times 0.1006$	$\uparrow$ $6 \times 0.0473$	$\nwarrow$ $4 \times 0.0223$	

- What is the expected number of hits in each game?

$$E(X) = 1.28$$

- Answer the following questions:

$$P(X=3) = 0.0892$$

$$P(X=1 \text{ or } X=2) = 0.6862$$

$$P(X < 1) = 0.2138$$

$$P(X > 1) = 0.3835$$

Probability that he gets 2 hits in a game

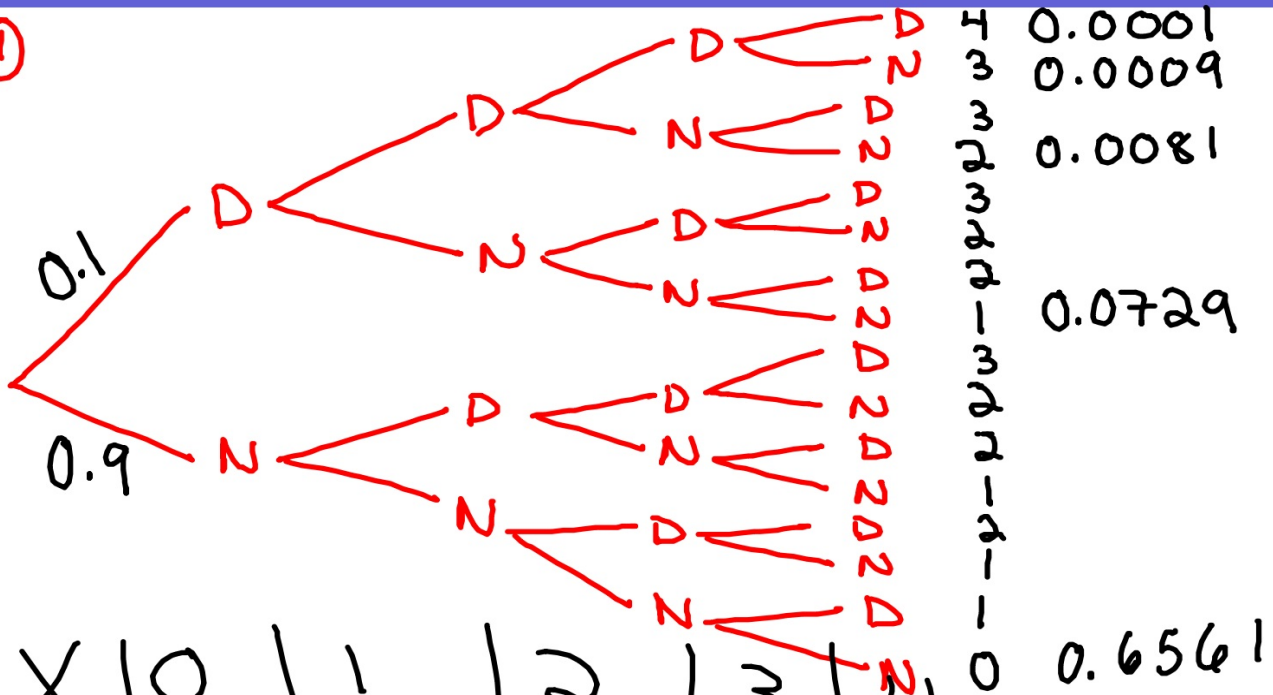
$$P(X=2) = 0.2838$$

TRY THE NEXT 3 EXAMPLES

①	X	0	1	2	3	4
	P(X)	0.6561	0.2916	0.0486	0.0036	0.0001

②	X	
	P(X)	

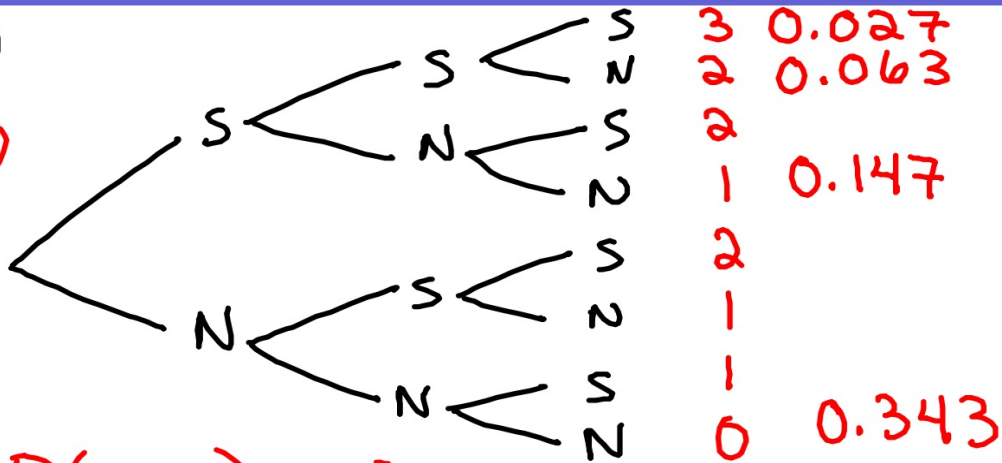
①



X	0	1	2	3	4
	0.6561		6x 0.0081	4x 0.0009	0.0001
		↑ 4x0.0729			

2

a



b)  $P(x=2) = 0.189$       d)  $P(x < 3) = 0.973$   
 c)  $P(x > 2) = 0.027$       e)  $P(x=1) = 0.441$

$x$	0	1	2	3
$P(x)$	0.343	0.441	0.189	0.027
		$\uparrow$	$\uparrow$	
		$3 \times 0.147$	$3 \times 0.063$	